

CLAIM AMENDMENT

Please amend the claims in accordance with the following listing.

Listing of Claims

1. (Currently Amended) A radiation shielding integrated circuit device comprising:

a die of an electronic circuit device;

[[a]] an x-ray shielding tub comprising a bottom portion and sidewalls extending from the bottom portion, the die being disposed on the bottom portion between the sidewalls; layer for shielding an electronic circuit device from receiving an amount of x-rays greater than the total dose tolerance of the electronic circuit device;

a base coupled to the bottom portion of the x-ray shielding tub opposite the die; and layer;

a radiation shielding top lid coupled to the base;

a radiation shielding bottom coupled to the base; and

the electronic circuit device coupled to the x-ray shielding layer, said x-ray shielding layer obstructing a line of sight path to said electronic circuit device from a localized external x-ray source;

wherein

the radiation shielding lid and the x-ray shielding tub are positioned to shield the die from x-rays from every angle, whereby the electronic circuit device die is shielded from receiving from all directions an amount of radiation greater than a total dose tolerance of the die; and electronic circuit device.

the radiation shielding lid is not in direct contact with the x-ray shielding tub so that the radiation shielding lid and the x-ray shielding tub do not completely enclose the die.

2. (Canceled)

3. (Currently amended) The radiation shielding integrated circuit device of claim 1 wherein the x-ray shielding ~~layer~~ tub has a first thickness, the radiation shielding lid has a second thickness, the second thickness being greater than the first thickness so that the radiation shielding lid provides greater shielding of ionizing radiation than the x-ray shielding tub.

4. (Canceled)

5. (Canceled)

6. (Currently Amended) The radiation shielding integrated circuit device of claim 1 wherein the radiation shielding ~~top~~ lid comprises a high Z material.

7. (Currently Amended) The radiation shielding integrated circuit device of claim 1 wherein the radiation shielding ~~top~~ lid comprises a high Z material and a low Z material.

8. (Currently Amended) The radiation shielding integrated circuit device of claim 1 further comprising a spacing ring coupled to the radiation shielding ~~top~~ lid and to the base.

9. (Original) The radiation shielding integrated circuit device of claim 8 wherein the spacing ring comprises a high Z material.

10. (Original) The radiation shielding integrated circuit device of claim 8 wherein the spacing ring comprises a low Z material.

11. (Canceled)

12. (Canceled)

13. (Canceled)

14. (Canceled)

15. (Canceled)

16. (Canceled)

17. (Canceled)

18. (Canceled)

19. (Currently Amended) A radiation shielding integrated circuit device comprising:

a base comprising a first surface and a second surface opposite the first surface;

a first x-ray shielding ~~layer~~ tub comprising a first bottom portion and first sidewalls extending from the first bottom portion, the first x-ray shielding tub being coupled to the first surface of the base;

a second x-ray shielding ~~layer~~ tub comprising a second bottom portion and second sidewalls extending from the second bottom portion, the second x-ray shielding tub being coupled to the second surface of the base;

a first circuit die ~~coupled to~~ disposed on the first bottom portion between the first sidewalls of the first x-ray shielding tub; layer;

a second circuit die ~~coupled to~~ disposed on the second bottom portion between the second sidewalls of the second x-ray shielding tub; layer;

a radiation shielding top coupled to the base; and

a radiation shielding bottom coupled to the base;

wherein

the radiation shielding top and the radiation shielding bottom comprise material shielding x-rays and ionizing radiation;

the first x-ray shielding tub and the second x-ray shielding tub comprise material shielding x-rays;

the radiation shielding top and the first x-ray shielding tub are positioned to shield the first die from x-rays from any angle;

the radiation shielding bottom and the second x-ray shielding tub are positioned to shield the second die from x-rays from any angle;

the thickness of the first x-ray shielding layer ~~is tub and the thickness of the radiation shielding top~~ are selected to shield the first circuit die from receiving an amount of x-rays greater than the total dose tolerance of the first circuit die; ~~and device, said x-rays being emitted from a localized external x-ray source;~~

~~wherein~~ the thickness of the second ~~radiation~~ x-ray shielding tub ~~and the thickness of the radiation shielding bottom~~ are ~~[[is]]~~ selected to shield the second circuit die from receiving an amount of x-rays greater than the total dose tolerance of the second circuit die. ~~device, said x-rays being emitted from said localized external x-ray source.~~

20. (Currently Amended) The radiation shielding integrated circuit device of claim 19 wherein

the radiation shielding top is spaced from the first sidewalls of ~~and the first x-ray shielding layer shield the first circuit die from radiation such that there is no line of sight path for the x-rays to the first circuit die;~~ tub, so that enclosure of the first circuit die by the radiation shielding top and the first x-ray shielding tub is incomplete; and

~~wherein~~ the radiation shielding bottom is spaced from the second sidewalls of ~~and the second x-ray shielding layer shield the second circuit die from radiation such that there is no line of sight path for the x-rays to the second circuit die.~~ tub, so that enclosure of the second circuit die by the radiation shielding bottom and the second x-ray shielding tub is incomplete.

21. (Original) The radiation shielding integrated circuit device of claim 19 further comprising:

a first spacing ring coupled to the radiation shielding top and to the base;

a second spacing ring coupled to the radiation shielding bottom and to the base.

22. (Previously Presented) The radiation shielding integrated circuit device of claim 21 wherein the first spacing ring and the second spacing ring comprise a high Z material.

23. (Original) The radiation shielding integrated circuit device of claim 21 wherein the first spacing ring and second spacing ring comprise a low Z material.

24. (Original) The radiation shielding integrated circuit device of claim 19 wherein the radiation shielding top and the radiation shielding bottom comprise a high Z material.

25. (Currently Amended) The radiation shielding integrated circuit device of claim 19 wherein the first ~~electronic~~ circuit ~~device~~ die is shielded from receiving an amount of radiation greater than a total dose tolerance of the first ~~electronic~~ circuit die. ~~device~~.

26. (Currently Amended) The radiation shielding integrated circuit device of claim 19 wherein the second ~~electronic~~ circuit ~~device~~ die is shielded from receiving an amount of radiation greater than a total dose tolerance of the second ~~electronic~~ circuit die. ~~device~~.

27. (New) The radiation shielding integrated circuit device of claim 20, wherein:
thickness of the radiation shielding top is greater than thickness of the first x-ray shielding tub; and
thickness of the radiation shielding bottom is greater than thickness of the second x-ray shielding tub.

28. (New) An integrated circuit, comprising:

at least one circuit die;

means for shielding the at least one circuit die from isotropic ionizing radiation, wherein the means for shielding the at least one circuit die from isotropic ionizing radiation is configured

to shield the at least one circuit die from x-ray radiation from first selected angles,

and

allows x-rays to reach the at least one circuit die from second selected angles; and

means for shielding the at least one circuit die from x-ray radiation from all angles.

29. (New) An integrated circuit, comprising:

at least one circuit die;

an x-ray shielding tub comprising a bottom portion and sidewalls extending from the bottom portion, the bottom portion and the sidewalls comprising material for shielding from x-rays;

a first radiation shielding lid comprising material for shielding from ionizing radiation and x-rays; and

a second radiation shielding lid comprising material for shielding from ionizing radiation and x-rays;

wherein:

the at least one circuit die is disposed in the x-ray shielding tub;

the x-ray shielding tub is disposed between the first radiation shielding lid and the second radiation shielding lid;

the x-ray shielding tub, the first radiation shielding lid, and the second radiation shielding lid are configured to shield the at least one circuit die from x-rays from every direction; and

the x-ray shielding tub, the first radiation shielding lid, and the second radiation shielding lid do not completely enclose the at least one circuit die.

30. (New) The integrated circuit of claim 29, wherein:

the first radiation shielding lid is not in direct contact with the x-ray shielding tub; and

the second radiation shielding lid is not in direct contact with the x-ray shielding tub.

31. (New) The integrated circuit of claim 29, wherein:

the x-ray shielding tub provides less shielding of ionizing radiation than the first radiation shielding lid; and

the x-ray shielding tub provides less shielding of ionizing radiation than the second radiation shielding lid.

32. (New) The integrated circuit of claim 29, wherein:

the x-ray shielding tub is thinner than the first radiation shielding lid; and

the x-ray shielding tub is thinner than the second radiation shielding lid.

33. (New) An integrated circuit, comprising:

a base;

at least one circuit die;

an x-ray shielding tub comprising a bottom portion and sidewalls extending from the bottom portion, the bottom portion and the sidewalls comprising material for shielding from x-rays;

a first lid comprising material for shielding from ionizing radiation and x-rays;

a second lid comprising material for shielding from ionizing radiation and x-rays;
a first spacing ring comprising material for shielding from x-rays; and
a second spacing ring comprising material for shielding from x-rays;
wherein:
the at least one circuit die is disposed in the x-ray shielding tub;
the x-ray shielding tub is disposed on the base between the first lid and the second lid;
the first spacing ring is disposed between the base and the first lid, surrounding the x-ray shielding tub;
the second spacing ring is disposed between the base and the second lid;
the x-ray shielding tub, the first and second lids, and the first and second spacing rings are configured to shield the at least one circuit die from x-rays from every direction; and
the x-ray shielding tub, the first and second lids, and the first and second spacing rings do not completely enclose the at least one circuit die.